

DOCUMENT RESUME

ED 215 913

SE 037 757

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TITLE Algebra I Level-Individual Instruction of the n
Variable of One Mixture Problem.
PUB DATE 82
NOTE 13p.
AVAILABLE FROM Kevin Fox, P.O. Box 344, Flushing, New York
11380-0344. Two-hundred (200) tests plus answer key
costs \$4.00. Each tape costs \$6.00. Two-hundred (200)
copies of page 1 costs \$4.00. Complete paper copy
costs \$1.00 (contains paper copy of tape, test, and
answer key).
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Algebra; *Audiotape Cassettes; Individual
Instruction; *Mathematical Formulas; *Problem
Solving; Secondary Education; *Secondary School
Mathematics

ABSTRACT

This material was prepared to help students understand the algebraic process involved in solving mixture problems. The paper copy is designed to be used with a 25-minute audiotape. Students are given a problem which is solved step by step; then they are to answer questions about each step. (MNS)

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TITLE: ALGEBRA I LEVEL-INDIVIDUAL INSTRUCTION OF THE n VARIABLE OF ONE MIXTURE PROBLEM.

Descriptors:

Algebra I Level-Individual Instruction-Mixture Formula Concepts-
Title I Method of Instruction-Cooperative Method of Instruction
(In-School-Instruction)-Audio Cassette Analysis of One Mixture
Problem-Paper Copy of Cassette Tape-Test and Answer Key supplied.

Content listed in Numerical Order:

1. Test and Answer Key supplied
2. Completed Mixture Problem analyzed
3. Expressions explained many ways
4. Algebraic Problem solving process
5. Mixture Formula concepts and word problem concepts
6. Recognize the question
7. Understand the question
8. Analyze the answer
9. Proof explained many ways
10. One unknown value analyzed
11. The words "let" and "then" are analyzed
12. Introduction to the "world of thought"

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TO THE EDUCATIONAL RESOURCES
INFORMATION CENTER (ERIC)."

Abstract:

This individual-instruction-set consists of one audio cassette and paper copy. This instruction-set was created for students who want to comprehend the algebraic formal problem solving process of Mixture Problems. This instruction-set is (1) low stress, (2) patiently delivered, (3) easy to follow. Symbols are continuously taken from the Completed Mixture Formula and are examined in a thoughtful manner. The audio cassette tape is approximately 25 minutes long-the paper copy of tape contains 7 pages. The format of the "Title I" Methods of Individual Instruction was followed. The format of the Cooperative Methods (in-school) of Individual Instruction was followed. Complementary Test and Answer Key supplied.

Two-hundred (200) tests plus answer key costs \$4.00. Each tape costs \$6.00.

Two-hundred (200) copies of page 1 costs \$4.00.

Complete paper copy costs \$1.00 (contains paper copy of tape, test and answer key).

SE037757

The above can be obtained by writing to: KEVIN FOX

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INSTRUCTIONS AND INFORMATION

1. Pages 4 to 10 contain the same information that is contained on the tape.
2. The content of this booklet (and tape) is directed to the analysis of one Mixture Problem.
3. The Mixture Problem is the following:
A baker added flour worth 40-cents per pound to flour worth 20-cents per pound. How many pounds of each did he use to make a mixture of 25 pounds to sell at 32-cents per pound?
4. Page 1 contains the completed formula for the above Mixture Problem.

INSTRUCTIONS FOR PLAYING THE AUDIO CASSETTE TAPE:

- (a) Position page 1 for comfortable reading.
- (b) Place tape in cassette.
- (c) Press "play".
- (d) IMPORTANT: While you are listening to the tape, you should constantly be looking at page 1.
- (e) After completing the tape, you should then complete the test which is contained on page 2.
- (f) The Answer Key is contained on page 3.

A baker added flour worth 40-cents per pound to flour worth 20-cents per pound. How many pounds of each did he use to make a mixture of 25 pounds to sell at 32-cents per pound?

- (A) Let n = the number of pounds of the 40-cent per pound flour.
- (B) Then $(25 - n)$ = the number of pounds of the 20-cent per pound flour.
- (C) Therefore $40n + 20(25 - n) = 32(25)$
- (D) $n + (25 - n) = 25$ (This line is not necessary to solve the value of n .)
- (E) $40n + 500 - 20n = 800$
- (F) $20n + 500 = 800$
- (G) $20n = 300$
- (H) $n = 15$
- (I) Therefore $(25 - n) = 10$
- (J) Answer: 15 pounds of the 40-cent per pound flour.
- (K) 10 pounds of the 20-cent per pound flour.
- (L) Proof: $\$.40(15) + \$.20(10) = \$.32(25)$
- (M) $\$6.00 + \$2.00 = \$8.00$
- (N) $\therefore \$8.00 = \$8.00$

Another check for proof:

- (O) Value of 15 pounds of flour at 40-cents per pound = \$6.00
- (P) Value of 10 pounds of flour at 20-cents per pound = \$2.00
- (Q) Total value..... = \$8.00
- (R) Value of 25 pounds (mixture) at 32-cents per pound = \$8.00

.....
The following five points of information are given in the Mixture Problem:

1. The total weight of the mixture is 25 pounds.
2. The total price of the mixture is \$8.00.
3. The price of each pound of the mixture is 32-cents.
4. The mixture contains two kinds of flour; one kind of flour costs 40 cents per pound; the other kind of flour costs 20 cents per pound.
5. The total mixture contains 25 pounds @ 32-cents per pound.

- INSTRUCTIONS:**
- Read the Completed Mixture Problem below the double dotted line.
 - The information below the double dotted line is the data base for the twenty questions in this test.
Read the data base carefully before you answer the twenty questions.
 - Place each answer in the box following each question.

- What is the simplest value of the number $(25 - n)$?
 - What is the value of the number n ?
 - What is the dollar value of 40 cents multiplied by the number n ?
 - What is the sum of adding $(-20n)$ to $(40n)$?
 - What is the dollar value of multiplying 20 cents by the number $(25 - n)$?
 - What negative number was added to Line "F" (that resulted in Line "G")?
 - What number was divided into Line "G" (that resulted in Line "H")?
 - What is the total weight of the Mixture?
 - What factor of $40n$ represents "pounds"?
 - What number represents "pounds" in the following expression: $32(25)$?
 - What number represents "pounds" in the following expression: $20(10)$?
 - How many kinds of flour are contained in the "Mixture"?
 - What number represents cents in the following expression: $32(25)$?
 - What is the weight value of the number n in Line "C"?
 - What is the money value of the number 40 in Line "C"?
 - What is the money value of the number 20 in Line "C"?
 - What is the money value of the number 32 in Line "C"?
 - What kind of money units are used in the following equation:
 $40n + 20(25 - n) = 32(25)$?
 - How many pounds of flour does the number n represent in Line "C"?
 - How many pounds of flour does the number $(25 - n)$ represent in Line "C"?
-

A baker added flour worth 40-cents per pound to flour worth 20-cents per pound. How many pounds of each did he use to make a mixture of 25 pounds to sell at 32-cents per pound?

- Let n = the number of pounds of the 40-cent per pound flour.
- Then $(25 - n)$ = the number of pounds of the 20-cent per pound flour.
- Therefore $40n + 20(25 - n) = 32(25)$
- $n + (25 - n) = 25$ (This line is not necessary to solve the value of n).
- $40n + 500 - 20n = 800$
- $20n + 500 = 800$
- $20n = 300$
- $n = 15$
- Therefore $(25 - n) = 10$
- Answer:** 15 pounds of the 40-cent per pound flour.
10 pounds of the 20-cent per pound flour.
- Proof:**

$\$.40(15)$	+	$\$.20(10)$	=	$\$.32(25)$
\$6.00	+	\$2.00	=	\$8.00
		\$8.00	=	\$8.00
- Another check for proof:
- Value of 15 pounds of flour at 40-cents per pound = \$6.00
- Value of 10 pounds of flour at 20-cents per pound = \$2.00
- Total value..... = \$8.00
- Value of 25 pounds (mixture at 32-cents per pound = \$8.00

The following five points of information are given in the Mixture Problem:

- The total weight of the mixture is 25 pounds.
- The total price of the mixture is \$8.00.
- The price of each pound of the mixture is 32-cents.
- The mixture contains two kinds of flour; one kind of flour costs 40 cents per pound; the other kind of flour costs 20 cents per pound.
- The total mixture contains 25 pounds @ 32-cents per pound.

ANSWER KEY

ANSWER KEY FOR: ALGEBRA I LEVEL-INDIVIDUAL INSTRUCTION OF THE n VARIABLE OF ONE MIXTURE PROBLEM

1. What is the simplest value of the number $(25 - n)$? 10
2. What is the value of the number n ? 15
3. What is the dollar value of 40 cents multiplied by the number n ? \$6.00
4. What is the sum of adding $(-20n)$ to $(40n)$? 20n
5. What is the dollar value of multiplying 20 cents by the number $(25 - n)$? \$2.00
6. What negative number was added to Line "F" (that resulted in Line "G")? -500
7. What number was divided into Line "G" (that resulted in Line "H")? 20
8. What is the total weight of the Mixture? 25 pounds
9. What factor of $40n$ represents "pounds"? n
10. What number represents "pounds" in the following expression: $32(25)$? 25
11. What number represents "pounds" in the following expression: $20(10)$? 10
12. How many kinds of flour are contained in the "Mixture"? two
13. What number represents cents in the following expression: $32(25)$? 32
14. What is the weight value of the number n in Line "C"? 15 pounds
15. What is the money value of the number 40 in Line "C"? 40 cents
16. What is the money value of the number 20 in Line "C"? 20 cents
17. What is the money value of the number 32 in Line "C"? 32 cents
18. What kind of money units are used in the following equation:
 $40n + 20(25 - n) = 32(25)$? cents
19. How many pounds of flour does the number n represent in Line "C"? 15
20. How many pounds of flour does the number $(25 - n)$ represent in Line "C"? 10

A baker added flour worth 40-cents per pound to flour worth 20-cents per pound. How many pounds of each did he use to make a mixture of 25 pounds to sell at 32-cents per pound?

- (A) Let n = the number of pounds of the 40-cent per pound flour.
 (B) Then $(25 - n)$ = the number of pounds of the 20-cent per pound flour.
 (C) Therefore $40n + 20(25 - n) = 32(25)$
 (D) $n + (25 - n) = 25$ (This line is not necessary to solve the value of n).
 (E) $40n + 500 - 20n = 800$
 (F) $20n + 500 = 800$
 (G) $20n = 300$
 (H) $n = 15$
 (I) Therefore $(25 - n) = 10$
 (J) Answer: 15 pounds of the 40-cent per pound flour.
 (K) 10 pounds of the 20-cent per pound flour.
 (L) Proof: $\$40(15) + \$20(10) = \$32(25)$
 (M) $\$6.00 + \$2.00 = \$8.00$
 (N) $\$8.00 = \$8.00$

Another check for proof:

- (O) Value of 15 pounds of flour at 40-cents per pound = $\$6.00$
 (P) Value of 10 pounds of flour at 20-cents per pound = $\$2.00$
 (Q) Total value..... = $\$8.00$
 (R) Value of 25 pounds (mixture at 32-cents per pound = $\$8.00$

The following five points of information are given in the Mixture Problem:

1. The total weight of the mixture is 25 pounds.
2. The total price of the mixture is \$8.00.
3. The price of each pound of the mixture is 32-cents.
4. The mixture contains two kinds of flour; one kind of flour costs 40 cents per pound; the other kind of flour costs 20 cents per pound.
5. The total mixture contains 25 pounds @ 32-cents per pound.

Hello, look at the Mixture Problem at the top of your sheet of paper.

Today, we are going to solve the Mixture Problem by using one variable. The variable is named n . The Mixture Problem is printed on the top of your sheet of paper. Your sheet explains how to solve the Mixture Problem. You should look at the printed Mixture Problem at the top of your sheet of paper.

I shall read the Mixture Problem to you: A baker added flour worth 40-cents per pound to flour worth 20-cents per pound. How many pounds of each did he use to make a mixture of 25 pounds to sell at 32-cents per pound?

Look at Line "H". I shall read Line "H" to you: $n = 15$. This tape will help you understand the completed method for finding the value of the number n . The number n represents 15. Also, the number n represents 15 pounds of the 40-cent per pound flour.

Look at Line "I". I shall read Line "I" to you: therefore $(25 - n) = 10$. Also, the number $(25 - n)$ represents 10 pounds of the 20-cent per pound flour.

This tape will help you understand the meaning and use of the number $(25 - n)$, which represents 10.

Look at the Mixture Problem at the top of your sheet of paper. Look at the number 25 contained in the Mixture Problem. This number 25 represents the same value as the number 25 in Line "B", Line "C", Line "D" and Line "I". In short, the number 25 contained in Line "B", Line "C", Line "D" and Line "I" represents 25 pounds.

Look at Line "A". Now, I shall read each line for you starting at Line "A".

- Line "A"- Let n = the number of pounds of the 40-cent per pound flour.
- Line "B"- Then $(25 - n)$ = the number of pounds of the 20-cent per pound flour.
- Line "C"- Therefore forty multiplied by n plus twenty multiplied by twenty-five minus n equals thirty-two multiplied by twenty-five.
- Line "D"- n plus twenty-five minus n equals twenty-five. (This line is not necessary to solve the value of n .)
- Line "E"- Forty multiplied by n plus five hundred minus twenty multiplied by n equals 800.
- Line "F"- Twenty multiplied by n plus 500 equals 800.
- Line "G"- Twenty multiplied by n equals 300.
- Line "H"- n equals 15
- Line "I"- Therefore twenty-five minus n equals 10.
- Line "J" and Line "K" is the answer.
- Now, I shall read Line "J" and Line "K"; which is the answer.
- Line "J"- Answer: 15 pounds of the 40-cent per pound flour
- Line "K"- (Which is also part of the answer) Again, Line "K"- 10 pounds of the 20-cent per pound flour
- Line "L"- Proof: Forty-cents multiplied by fifteen plus twenty-cents multiplied by ten equals thirty-two cents multiplied by twenty-five.
- Line "M"- Six dollars plus two dollars equals eight dollars.
- Line "N"- Therefore, eight dollars equals eight dollars.
- Another check for proof:
- Line "O"- Value of 15 pounds of flour at 40-cents per pound = \$6.00
- Line "P"- Value of 10 pounds of flour at 20-cents per pound = \$2.00
- Line "Q"- Total Value..... = \$8.00
- Line "R"- Value of 25 pounds (mixture) at 32-cents per pound = \$8.00

The Algebraic Problem Solving Process is identified and described by the following lines: A,B,C,D,E,F,G,H,I,J,K; eleven in all. Obviously, when you have completed Line "J" and Line "K" the answer is completed; the lines following the answer are checks for proof.

Look at Line "D". Line "D" is not necessary in order to solve the value of n .

Line "D" is used only to help explain and analyze the Mixture Problem.

Look at Line "C". The $40n$ in Line "C" was derived from Line "A". The 40 in $40n$ represents 40-cents. The n in $40n$ represents the number 15 (or 15 pounds). The $20(25 - n)$ in Line "C" was derived from Line "B". The 20 in $20(25 - n)$ represents 20-cents. The $(25 - n)$ in $20(25 - n)$ represents the number 10 (or 10 pounds). The symbol n represents a number. The number n represents 15. The symbol $(25 - n)$ represents a number. The number $(25 - n)$ represents 10. The $32(25)$ in Line "C" was derived from the question part of the Mixture Problem. Look at the Mixture Problem. Look at the part of the Mixture Problem that says "25 pounds to sell at 32-cents per pound?" The $32(25)$ in Line "C" was derived from the following: "25 pounds to sell at 32-cents per pound?" of the Mixture Problem.

You should keep looking at Line "C".

$40n$ is the same as 40 multiplied by n .

$40n$ is the same as 40-cents multiplied by n number of pounds.

$40n$ is the same as n number of pounds @ 40-cents per pound.

$40n$ is the same as 40-cents multiplied by 15.

$40n$ is the same as 15 pounds @ 40-cents per pound.

$40n$ is the same as 600 cents.

$40n$ is the same as \$6.00.

You should keep looking at Line "C".

$(25 - n)$ is the same as 10 pounds of flour.

$(25 - n)$ is the same as the number 10.

The number 25 on the left side of Line "C" means 25 pounds.

The number 25 on the right side of Line "C" means 25 pounds.

The number $(25 - n)$ is the same as 10 pounds.

The number $(25 - n)$ is contained in Line "B", Line "C", Line "D" and Line "I".

In short, the number $(25 - n) = 10$, and the number $n = 15$.

Now, I am going to read Line "C" to you.

Therefore 40 multiplied by n plus 20 multiplied by $(25 - n)$ equals 32 multiplied by 25 .

$20(25 - n)$ is the same as 20-cents multiplied by $(25 - n)$ number of pounds.

$20(25 - n)$ is the same as $(25 - n)$ number of pounds @ 20-cents per pound.

$20(25 - n)$ is the same as 20-cents multiplied by 10.

$20(25 - n)$ is the same as 10 pounds @ 20-cents per pound.

$20(25 - n)$ is the same as 200 cents.

$20(25 - n)$ is the same as \$2.00.

You should keep looking at Line "C". Look at $32(25)$.

Thirty-two multiplied by twenty-five is the same as thirty-two cents multiplied by twenty-five.

Thirty-two multiplied by twenty-five is the same as twenty-five pounds at thirty-two cents per pound.

Thirty-two multiplied by twenty-five is the same as eight hundred cents.

Thirty-two multiplied by twenty-five is the same as eight dollars.

Look at Line "E". Line "E" was derived from Line "C". The $40n$ in Line "E" was obtained from Line "C". The $500 - 20n$ in Line "E" is the result of multiplying 20 by $(25 - n)$ which was obtained from Line "C". Twenty multiplied by 25 equals 500, which was obtained from Line "C". This 500 was placed in Line "E". Twenty multiplied by negative n results in $-20n$; which was obtained from Line "C". This $-20n$ was placed in Line "E". The $32(25)$ in Line "C" results in 800. This 800 was placed in Line "E".

Now, we are going to simplify Line "E". I'm going to read Line "E" to you.

Line "E": 40 multiplied by n plus 500 minus $20n$ equals 800 .

Line "F" is the result of simplifying Line "E". We are going to simplify Line "E".

Look at Line "E". Add $40n$ to negative $20n$ (or subtract $20n$ from $40n$); the result is $20n$.

Place this $20n$ in Line "F". Transfer the 500 of Line "E" to Line "F". Transfer the

800 from Line "E" to Line "F". I'm going to read Line "F" to you.

Line "F": 20 multiplied by n plus 500 equals 800 . Line "F" was derived from Line "E".

The next step is to simplify Line "F". Look at Line "F".

Add negative 500 to both sides of Line "F" (or subtract 500 from both sides of Line "F"): the result is $20n = 300$. This result is called Line "G". Line "G" was derived from Line "F". Look at Line "G". Divide 20 into both sides of Line "G".

Twenty divided into $20n$ results in n . Place this n in Line "H". Look at Line "G". Twenty divided into 300 results in 15. Place this 15 in Line "H". I'm going to read Line "H" to you: $n = 15$. This number 15 means 15 pounds of the 40-cent per pound flour. In short, the value of n is 15. Look at Line "A". The n in Line "A" is equal to 15. Look at Line "B". Look at $(25 - n)$. The next step is to simplify $(25 - n)$. Subtract the value of n from 25; the result is 10; because $25 - 15 = 10$. Look at Line "B". The value of $(25 - n)$ of Line "B" is 10 or 10 pounds. In short, $(25 - n) = 10$.

Look at Line "A". Look at the word "let" in Line "A". We are going to study the meaning of the word "let". The word "let" means the following condition: "I agree to allow." The following four words: "I agree to allow" have the same meaning as the word "let" in Line "A".

I'm going to substitute the following four words "I agree to allow" for the word "let" in Line "A". Now, I shall read Line "A" to you.

Line "A": I agree to allow n to equal the number of pounds of the 40-cent per pound flour.

Now, we can see that the word "let" contains the following condition: "I agree to allow."

The following is a very important concept. From the agreed conditions contained in Line "A" flows the word "then" in Line "B". In short, the conditions contained in Line "A" are necessary in order to create Line "B". Line "B" was developed from Line "A".

Look at Line "C". Line "C" was developed from Line "A", Line "B" and "25 pounds to sell at 32-cents per pound?" of the Mixture Problem. Look at Line "C". The $32(25)$ on the right side of Line "C" was derived from the question part of the Mixture Problem. Thirty-two multiplied by twenty-five means thirty-two cents multiplied by twenty-five (or twenty-five pounds at thirty-two cents per pound).

Look at the Mixture Problem at the top of your sheet of paper. How much key information did you get by reading the Mixture Problem? It is desirable to see clearly the following five key information points. The following five key information

points are given in the Mixture Problem. Keep looking at the Mixture Problem while I identify the five key information points- see if you can recognize the following key information points while you are looking at the Mixture Problem.

The following five points of information are given in the Mixture Problem:

1. The total weight of the mixture is 25 pounds.
2. The total price of the mixture is \$8.00.
3. The price of each pound of the mixture is 32-cents.
4. The mixture contains two kinds of flour.
5. The total mixture contains 25 pounds @ 32-cents per pound.

Now, look at the double dotted line at the bottom of your sheet of paper.

I shall read to you the information below the double dotted line:

The following five points of information are given in the Mixture Problem:

1. The total weight of the mixture is 25 pounds.
2. The total price of the mixture is \$8.00.
3. The price of each pound of the mixture is 32-cents.
4. The mixture contains two kinds of flour; one kind of flour costs 40 cents per pound; the other kind of flour costs 20 cents per pound.
5. The total mixture contains 25 pounds @ 32-cents per pound.

Yes, these five information points are given in the Mixture Problem.

Now, I shall read the Mixture Problem to you:

A baker added flour worth 40-cents per pound to flour worth 20-cents per pound. How many pounds of each did he use to make a mixture of 25 pounds to sell at 32-cents per pound?

Now, I shall read the question part of the Mixture Problem to you:
How many pounds of each did he use to make a mixture of 25 pounds to sell at 32-cents per pound?

That question must be answered. It is very important to read the question very, very, carefully.

Look at Line "A". Now, I shall read Lines A,B,C,D,E,F,G,H,I,J,K to you.

In this reading, I want you to keep in mind that $n = 15$ and that $(25 - n) = 10$.

Look at Line "A".

Line "A" - Let 15 = the number of pounds of the 40-cent per pound flour.

Line "B" - Then 10 = the number of pounds of the 20-cent per pound flour.

Line "C" - Therefore forty-cents multiplied by 15 plus twenty-cents multiplied by 10 = thirty-two cents multiplied by 25.

Line "D" - Fifteen pounds plus 10 pounds = 25 pounds (this line is not necessary to solve the value of n)

Line "E" - Forty multiplied by 15 plus 500 - 20n = 800

Line "F" - Twenty multiplied by 15 plus 500 = 800

Line "G" - Twenty multiplied by 15 = 300

Line "H" - 15 = 15

Line "I" - Therefore 10 = 10

Line "J" - Answer: 15 pounds of the 40-cent per pound flour.

Line "K" - (Which is part of the answer) Again, Line "K" - 10 pounds of the 20-cent per pound flour.

The number 15 contained in Line "J" is the value of n.

I shall conclude this analysis by asking you to develop enthusiasm for studying the smallest mathematical symbol. This developed enthusiasm will help you enter the "world of thought".

I wish to thank you for your kind attention. I tried to make this analysis interesting. We have now come to the end of this tape.